



PATENT
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

HAMADA et al.

Application No. 09/425,630

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For: FLOW RATE MEASURING
DEVICE

Art Unit: 2855

Examiner: C. Dickens

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**PENDING CLAIMS AFTER AMENDMENTS
MADE IN RESPONSE TO OFFICE ACTION DATED SEPTEMBER 24, 2001**

1. A flow rate measuring device comprising:
 - a post located in a fluid passage for passing a fluid flow and extending across a part of the fluid flow;
 - a measuring duct in the post, the measuring duct having
 - a fluid introduction port with an elongated shape confronting a flow direction of the fluid flow and,
 - a first pair of generally smooth, converging inner wall surfaces, narrowing toward a downstream direction of the fluid flow, each of the smooth inner wall surfaces having a profile, in a cross-section parallel to the fluid flow direction and parallel to the post, including an inflection point, and
 - a single hole downstream of the fluid introduction port for exiting of the fluid flow from the measuring duct; and
 - a flow rate detector located in the measuring duct.
2. The device according to Claim 1, wherein the measuring duct extends substantially linearly in a direction from an upstream side of the fluid passage toward a downstream side of the fluid passage.
3. The device according to Claim 1, wherein the fluid introduction port has a length in the longitudinal direction and a width in a transverse direction, transverse to the longitudinal direction, the longitudinal length being at least twice the width.

4. The device according to Claim 1, wherein the measuring duct includes a second pair of generally smooth converging inner wall surfaces, generally transverse to the first pair of inner wall surfaces, narrowing in the downstream direction, and having a curved profile in a plane perpendicular to the fluid introduction port and parallel to a longitudinal direction of the fluid introduction port.

6. The device according to Claim 1, wherein the measuring duct is narrows to at least a position where an upstream end of the flow rate detector is located.

7. The device according to Claim 1, wherein the measuring duct narrows to at least a position where a flow rate detecting element of the flow rate detector is located.

8. The device according to Claim 1, wherein the fluid introduction port has, in a plane perpendicular to the fluid flow, a closed curve shape.

9. The device according to Claim 1, wherein the measuring duct has a second pair of inner wall surfaces, generally transverse to the first pair of inner wall surfaces, and extending from a location upstream of the flow rate detector to the flow rate detector and narrowing toward the downstream direction, in a transverse direction of the fluid introduction port.

10. The device according to Claim 1, wherein the measuring duct includes a notch at the single hole.

11. The device according to Claim 1, wherein the measuring duct includes an outer wall surface that, at least in part, extends outwardly.

12. The device according to Claim 1, including projections located on the duct near the fluid introduction port and extending in an upstream direction.

13. The device according to Claim 12, wherein the fluid introduction port has a substantially rectangular shape in a plane transverse to the fluid flow, and the projections are located at at least one pair of long sides and short sides of the fluid introduction port, the projections being parallel plates.

14. The device according to Claim 1, wherein the post extends into the fluid passage through an opening in a side wall of the fluid passage.

15. A flow rate measuring device comprising:
a post located in a fluid passage for passing a fluid flow and extending across a part of the fluid flow;
a measuring duct in the post, the measuring duct having
a fluid introduction port with an elongated shape confronting a flow direction of the fluid flow, and
a first pair of generally smooth, converging inner wall surfaces, narrowing toward a downstream direction of the fluid flow, each of the smooth inner wall surfaces having a profile, in a cross-section parallel to the fluid flow direction and to the post, including an inflection point; and
a flow rate detector located in the measuring duct and comprising a substantially plate-shaped mounting member extending along the fluid flow, substantially parallel to a longitudinal direction of the fluid introduction port, and a flow rate detection element on a main surface of the mounting member.

16. A flow rate measuring device comprising:
a post located in a fluid passage for passing a fluid flow and extending across a part of the fluid flow;
a measuring duct in the post, the measuring duct having
a fluid introduction port with an elongated shape confronting a flow direction of the fluid flow and,
a first pair of generally smooth, converging inner wall surfaces, narrowing toward a downstream direction of the fluid flow, each of the smooth inner wall surfaces having a profile, in a cross-section parallel to the fluid flow direction and to the post, including an inflection point, and
a single hole downstream of the fluid introduction port for exiting of the fluid flow from the measuring duct; and
a flow rate detector located in the measuring duct and comprising a substantially plate-shaped mounting member extending along the fluid flow, substantially parallel to a longitudinal direction of the fluid introduction port, and a flow rate detection element on a main surface of the mounting member.